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## TRANSACTIONS.

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No. 816.

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### THE LAKE FRONT IMPROVEMENTS OF THE ILLINOIS CENTRAL RAILROAD IN CHICAGO.

By JOHN FINDLEY WALLACE, M. Am. Soc. C. E.  
PRESENTED SEPTEMBER 1ST, 1897.

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#### WITH DISCUSSION.

*History.*—The original Illinois Central Railroad was chartered in 1850, to build a line from Cairo, at the junction of the Ohio and Mississippi Rivers, to Dubuque, Ia., with a branch line from the present city of Centralia, Ill., to Chicago. This line was constructed in 1852, entering Chicago along the shore of Lake Michigan and having its terminal station located between Randolph Street and the Chicago River. The southern limit of the city at that time was Twenty-second Street. The right of way of the railroad was purchased in fee simple up to what is known as Park Row, near Twelfth Street, while from Park Row to Randolph Street a right of way 300 ft. wide was granted by the city under an ordinance dated June 14th, 1852, the railroad company agreeing to build a wall or breakwater along the outside edge of its right of way as far as the southern limits of the city, in order to protect the city shore line from the encroachments of Lake Michigan. However, as the railroad's charter from the State of Illinois

specifically determined that its right of way should be 200 ft. in width, the railroad company was restricted to that width, and it therefore constructed the breakwater on the outside edge of the 200-ft. right of way in accordance with the provisions of the ordinance.

A considerable portion of what is now solid ground east of Michigan Avenue, from Park Row to Randolph Street, a distance of 5 995 ft., was at that time Canal Lands, and Michigan Avenue was platted on the city maps without any eastern boundary. The west line of this avenue, however, was definitely fixed and the property west of that thoroughfare was laid out in lots, streets and alleys; but on the east side, the width of the avenue was supposed to extend to the shore of the lake, as there was at that time no appreciable amount of land east of the roadway.

The Illinois Central Railroad was originally constructed as a single-track line on a trestle, and the western boundary of its right of way was 400 ft. east of the west line of Michigan Avenue, the waters of Lake Michigan occupying the intermediate space between the railroad track and the avenue.

After the fire of 1871, this space, as well as a large part of the Illinois Central right of way, was filled with débris from the ruins, and the ground between Michigan Avenue and the west line of the railroad right of way became known as the Lake Front Park.

In 1869 the Legislature of the State of Illinois by an act granted to the Illinois Central Railroad Company the right to all submerged land east of its right of way for a distance of 1 mile into the lake and between the Chicago River and its round-house south of Fourteenth Street, a distance of 1.85 miles, the fee to the submerged land constituting the bed of Lake Michigan being vested in the State. This grant was, of course, subject to the establishment of a shore and dock line either by the State or United States officials. In 1873 this act was repealed.

The matter was finally taken into the United States Court, the Illinois Central Railroad Company claiming that the State had no constitutional power to pass the repealing act, which amounted to the annulment of the contract. The City of Chicago interfered in the case, claiming that the fee to all the submerged land previously granted to the railroad company belonged to it (the city), taking the ground that the city owned the riparian rights along the lake front

for the reason that the east line of Michigan Avenue was not defined by metes and bounds but was bounded on the east by the lake, and that therefore the city owned the riparian rights through its ownership of Michigan Avenue as a street. Other questions of interest were also involved, which brought into dispute the rights of the Illinois Central Railroad to not only the submerged land between Randolph Street and Park Row, but also to the piers which it had already constructed and the ground it had reclaimed from the lake between the Chicago River on the north and Sixteenth Street on the south, as well as to the occupancy of the lands, docks and wharves which it had previously acquired. Pending the trial of this case the railroad company was enjoined from extending its docks or properties into the waters of the lake.

The decision in the United States Court confirmed to the railroad company the right to all the ground and property it had acquired and was in possession of at the time of the commencement of the litigation, but was unfavorable to the railroad company in other particulars. The case was finally carried to the Supreme Court and decision rendered in 1892, which in substance confirmed to the Illinois Central Company its title to all the submerged land, docks and wharves it had acquired by filling in the lake, but confirmed to the city its rights as riparian owner of the land filled in adjoining Michigan Avenue on the east. The decision further confirmed to the Illinois Central Railroad Company its perpetual and exclusive right, for railroad purposes, to the right of way occupied by it between Park Row and Randolph Street. Many minor points in the decision, however, settled principles of vast importance to both public and private corporations, in reference to the use, occupancy and ownership of water fronts.

The long-continued litigation between the city and the railroad company resulted in much public irritation, and the tenor of public opinion was adverse to the interests of the railroad company. Immediately after the decision of the Supreme Court had been rendered, certain private citizens, in connection with the city government and the press, commenced an agitation which resulted in considerable friction between the railroad company and the public, the object being to force the company to depress its tracks along the lake front. Threats were made to open up various public streets intersecting Michigan Avenue across the tracks of the railroad company at

grade, and objections were made to the railroad company fencing in its right of way in order to prevent accidents. The seriousness of these demands and the injury they would work to the public as well as the railroad company can be more easily understood when it is stated that at this time the Illinois Central right of way, 200 ft. in width, and extending from Park Row to Randolph Street, was occupied by twelve or thirteen tracks, over which there were more than 1 000 engine movements in every twenty-four hours, in addition to the partial or switching movements made at the north end of the passenger yards near Park Row and over the switching leads in and out of the Randolph Street yard extending southward.

Prior to 1892 thousands of people were continually crossing the tracks at grade, in order to obtain access to the lake for boating, fishing or other pleasure purposes. The difficulty was partially remedied during the World's Columbian Exposition of 1893 by the construction of a viaduct across these tracks at Van Buren Street and the building of a fence along the west line of the right of way between Randolph Street and Park Row.

In 1894 the city authorities insisted on the removal of the viaduct, the taking down of the fence and the throwing open to the public of the entire right of way between these points, in spite of the known fact that accidents endangering life and limb would be of daily occurrence. This demand was undoubtedly intended to force the railroad company to some permanent settlement of the difficulty.

The situation became extremely critical. After the railroad company had offered to construct foot viaducts over its tracks at such points as the city might designate, and had been refused permission to do so, the officials of the railroad company, in conference with the city officials, finally agreed on a compromise of the entire matter. This resulted in the passage of an ordinance by the Chicago City Council, dated October 21, 1895, and the subsequent execution of a contract in accordance therewith between the city and the railroad company.

This contract provided that the Illinois Central Railroad should do the following work:

1. Depress its tracks on the Lake Front between Park Row and Randolph Street to a depth of approximately 4 ft., according to certain grades specified in the agreement.

2. Construct a sea wall along what is known as the dock line, approximately 1 200 ft. east of the Illinois Central right of way, from Randolph Street to the vicinity of Park Row extended, with a return wall to the shore; also to construct certain piers in order to form a yacht harbor at 12th Street.

3. Build retaining walls on each side of its right of way, as described in said agreement.

4. Deliver 200 000 cu. yds. of filling in the Lake Front Park between the Illinois Central right of way and Michigan Avenue.

5. Construct four viaducts for carriages at such streets as should be selected by the city authorities, and one viaduct for pedestrians at

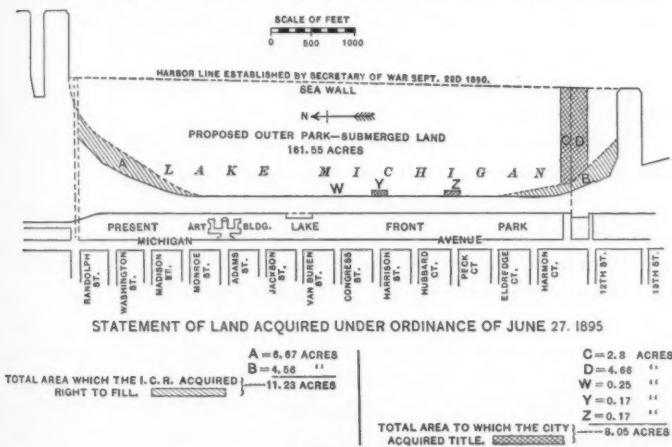


FIG. 1.

the foot of each of the other streets intersecting Michigan Avenue, which, if projected, would cross the Illinois Central right of way between the two points named.

6. Extend and rebuild as much of the Randolph Street viaduct as might be necessary to obtain access to the new park which it is the intention of the city to construct between the east line of the Illinois Central right of way and the sea wall before mentioned.

7. Construct a new suburban station at Van Buren Street, 300 ft. long and 50 ft. wide.

8. Cede to the city certain riparian rights to 7.46 acres of land, and further cede to the city 0.59 acre of ground which it (the rail-

road company) had previously filled in and utilized; making a total of 8.05 acres.

In return for this the Illinois Central Railroad Company received from the city the right to fill in and occupy 6.67 acres of land between Adams and Randolph Streets; 1.26 acres between Park Row and Peck Court to which the city had claimed riparian rights; and 3.30 acres between the south line of Park Row and the 13th Street pier, to which the railroad company had heretofore claimed riparian rights; making a total of 11.23 acres, the right to fill and occupy which, the railroad company obtained from the city.

This agreement forever ended the general differences that had existed for years between the city and the railroad company, and confirmed to the railroad company its right to forever enjoy and use its right of way and property north of Park Row.

Fig. 1 shows the areas of land transferred from the railroad company to the city and *vice versa*.

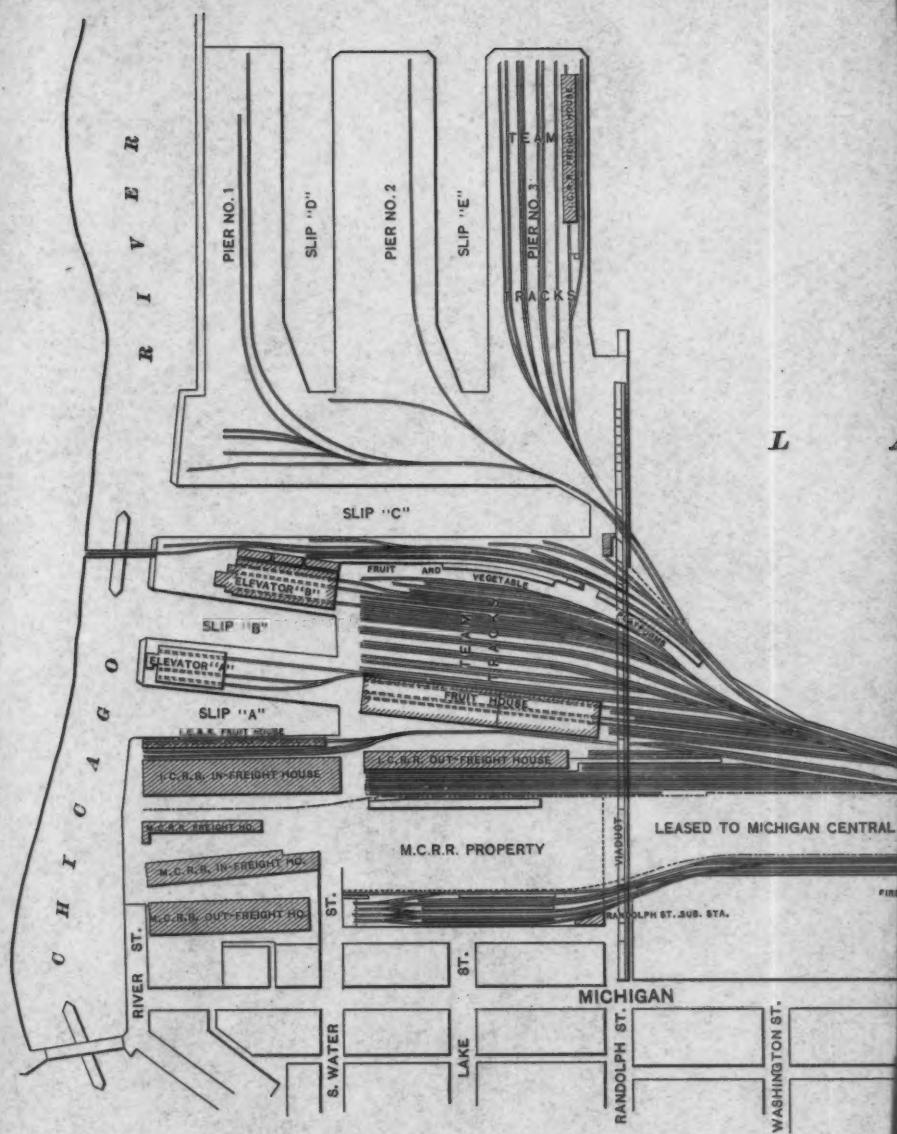
Plate V shows the original location of the tracks of the Illinois Central Railroad prior to the carrying out of this agreement.

Plate VI shows the completed plan of the tracks which the acquisition of the additional land enabled the railroad company to construct.

The work of carrying out the provisions of this ordinance was commenced almost immediately after its passage and the acceptance of the contract, and up to the time of writing this paper the following portions have been completed: Depression and rearrangement of tracks; west retaining wall; sea wall; Van Buren Street station; viaducts at Harrison Street, Peck Court and Van Buren Street; filling of the triangular pieces of submerged land acquired from the city; filling of Lake Front Park, between Michigan Avenue and railroad right of way.

These Lake Front improvements were estimated to cost, when finally completed, \$1 200 000.

*Depression and Rearrangement of Tracks.*—The general level of Michigan Avenue is 12 to 15 ft. above the Chicago city datum, datum being based upon the low water in Lake Michigan. The recorded fluctuation of water in the lake has varied from about 1 ft. below to 4 ft. above low water (city datum), making a total variation of approximately 5 ft. The general elevation of the Illinois Central tracks varied from 9 ft. above at Randolph Street to 11 ft. above at Park Row.





**K**

**E**

**M**

**I**

**C**

**H**

**I**

SCALE OF FEET

0 100 200 300 400 500 600 700 800 900 1000

AILROAD CO.



VAN BUREN ST.  
SUBURBAN STA.

L A K E

F R O

MONROE ST.

ADAMS ST.

JACKSON ST.

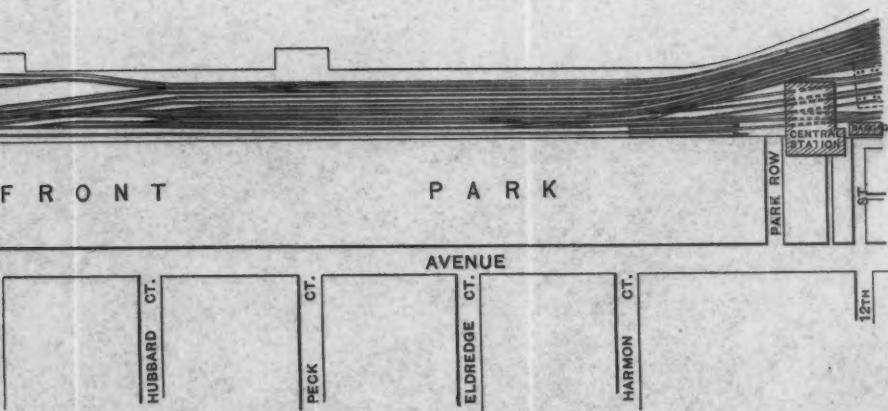
VAN BUREN ST.

CONGRESS ST.

HARRISON ST.

PLATE V.  
TRANS. AM. SOC. CIV. ENGRS.  
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WALLACE ON LAKE FRONT IMPROVEMENTS.

I G A N





The city authorities desired the tracks depressed to the maximum amount in order that bridges might be built over them at points opposite the extensions of certain streets to connect with the proposed larger park east of the Illinois Central right of way, with moderate approaching grades from Michigan Avenue to the western ends of these bridges. At one time the city contemplated the depression of the tracks below the level of Lake Michigan and roofing them over, except at suitable intervals for ventilation, in order to hide entirely the sight of cars and trains from the adjoining city parks. This was quite impracticable, not only on account of the enormous expense it would have entailed, but also by reason of the difficulty in the way of obtaining suitable drainage, as well as on account of the location of the Central Station south of Park Row and the local freight houses and freight terminal tracks north of Randolph Street, the switching leads for which extended as far south as Van Buren Street.

The railroad company contended that it should not be required to lower its tracks to any greater depth than would be necessary to enable proper viaducts to be constructed with suitable approaches thereto, and that would allow drainage to be secured into Lake Michigan by gravity.

The final result was an agreement that the railroad company should depress its tracks to a grade of 6 ft. above city datum at each edge of the 200-ft. right of way, with a crowning transverse grade to 7 ft. in the center; the object being to deflect the drainage to either side of the right of way and then take care of it by a system of subdrainage.

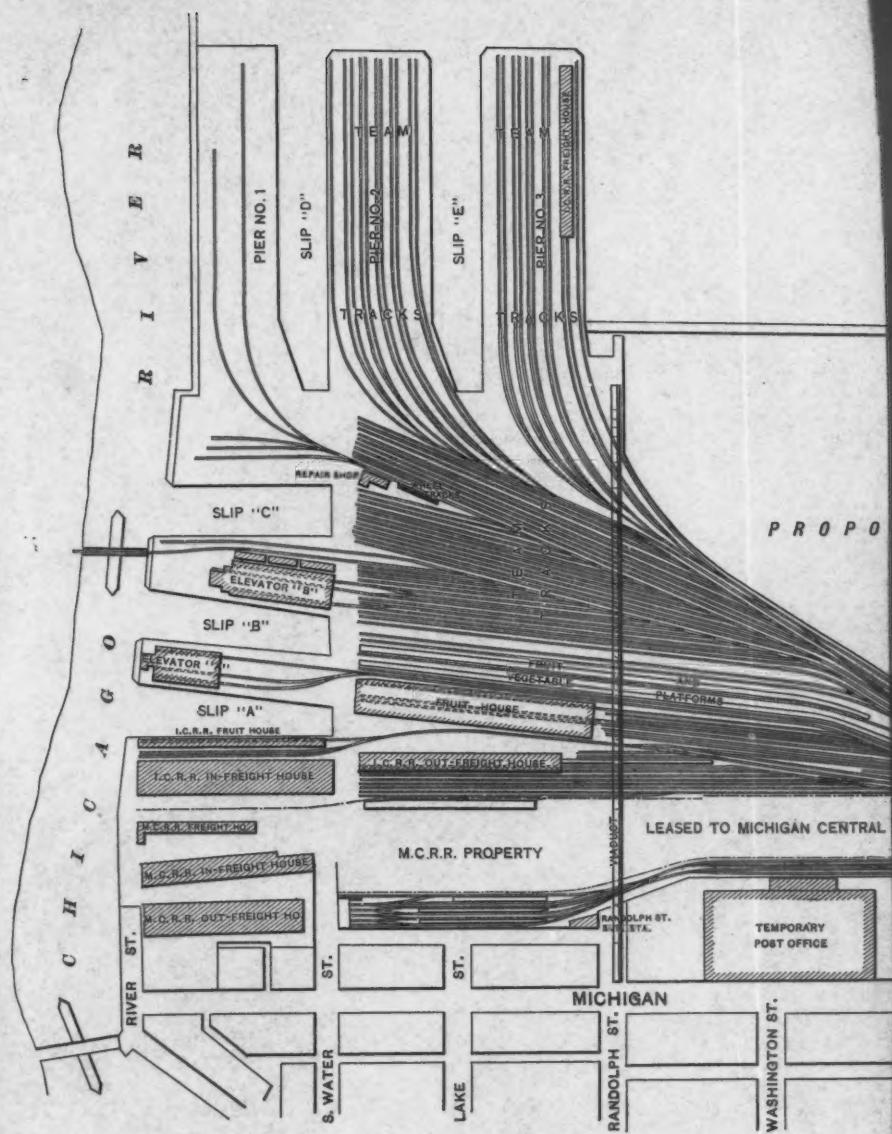
Owing to the requirements of the city preventing the use of deep girders or long pin-connected spans for the various viaducts, it was necessary to construct these viaducts of comparatively short spans with intermediate supports, which in turn necessitated an entire rearrangement of the tracks. The problem, therefore, not only consisted of the depression of the tracks under traffic, but their entire rearrangement as well. A careful examination of the plans, showing the lay-out before and after this work was done, will show that each track was designed to perform a certain function. A brief description of the business done over these tracks is necessary to an intelligent understanding of the plan.

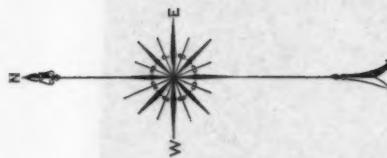
The business of the Illinois Central Railroad on the Lake Front north of Park Row is varied and complex in character. The tracks

north of Randolph Street, next to Central Avenue, are the suburban terminal tracks, Randolph Street being the terminal for all suburban trains. What is known as the local suburban service occupies tracks 1 and 2 on the west edge of the right of way, the trains in this service making stops at all stations and running southward as far as Sixty-third Street. What is known as the express suburban service makes use of the same terminal station at Randolph Street, and follows the same tracks 1 and 2 as far as Van Buren Street, where it uses the same station also, south of that point diverging and running entirely around the Central Station at Twelfth Street, these express tracks being so located as to be interfered with and cut into by frogs and switches as little as possible. After leaving the junction with tracks 1 and 2 south of Van Buren Street and passing over the crossing at Harrison Street, these tracks are cut by only two sets of cross-overs, at Twenty-seventh and Forty-third Streets, in the entire distance of 9 miles between Randolph and Seventieth Streets, the latter point, however, that is, Forty-third Street, being protected and controlled by an interlocking plant. There are no street crossings at grade north of Seventieth Street. The crossing at Harrison Street was selected as the neutral point, north of which all the switching in and out of the Randolph Street yard is done, while all switching in and out of the passenger yards at Twelfth Street is performed south of this point, confining the movements crossing the express suburban tracks at Harrison Street entirely to through movements by trains and transfers in and out of the Randolph Street yard to other points on the Illinois Central system and connecting lines.

Parallel to tracks 1 and 2, leading out of Randolph Street station, and parallel to the express tracks, will be noticed two tracks which connect the system of tracks on what is known as the Thirteenth Street pier with the suburban terminal at Randolph Street, the purpose of these tracks being to feed suburban trains and engines in and out of the suburban terminal without using or fouling tracks 1 and 2 between Randolph and Harrison Streets.

In the Randolph Street yard is located the entire freight terminal of the Michigan Central Railroad, which occupies land leased in perpetuity from the Illinois Central Company, and which uses the terminal tracks of the Illinois Central Railroad from Kensington to Randolph Street as tenant. Tracks 4 and 5 next east of and adjoining the





L A K E E

M I C H I G A N

BULKHEAD

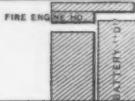
BULKHEAD

POSED LAKE FRONT PARK EXTENSION

SCALE OF FEET

0 100 200 300 400 500 600 700 800 900 1000

TRAL RAILROAD CO.



SUBURBAN STA.

L A K E

MADISON ST.

MONROE ST.

ADAMS ST.

JACKSON ST.

VAN BUREN ST.

CONGRESS ST.

HARRISON ST.

PLATE VI.  
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H I G A N

BULKHEAD

BULKHEAD

ENSION

(NOW

SUBMERGED)

FRONT

PARK

HARRISON ST.

HUBBARD CT.

AVENUE

PECK CT.

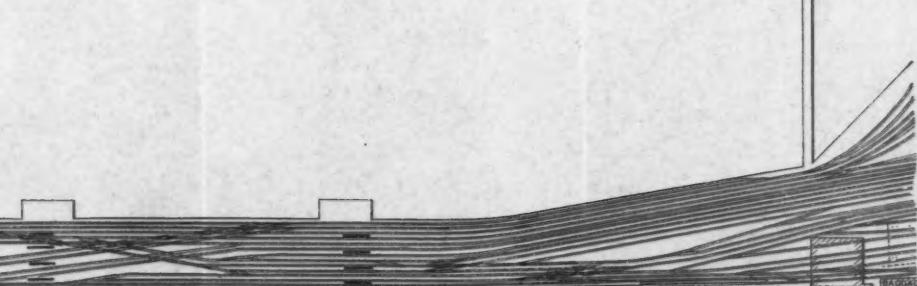
ELDREDGE CT.

HARMON CT.

PARK ROW

CENTRAL STATION

12TH ST.





suburban feed tracks of the Illinois Central are assigned to the Michigan Central Railroad as leads to its Randolph Street freight yard.

The entire freight terminal of the Illinois Central, including freight houses, fruit houses, elevators, team yards, etc., is also in the Randolph Street yard.

Prior to the passage of the ordinance above mentioned, neither the Illinois Central nor Michigan Central railroads had the right to stand any cars on their tracks south of the north line of Randolph Street, or construct any buildings south of that point. By the new agreement the railroads have the right to stand cars or erect structures on the right of way to the height of the retaining wall or the parapet thereon.

The shape of the railroad ground under the old arrangement, as will be noticed by reference to Plate V, was such as to interfere very materially with economical switching in and out of this yard. The new arrangement, as shown on Plate VI, provides for a considerable extension of the team tracks and other yard facilities, as well as giving eight independent switching leads, with necessary crossovers and connections, allowing the use of a large number of switch engines working independently of each other, and thus materially adding, not only to the capacity, but also to the efficiency, of the Illinois Central terminal.

The work of depressing these tracks was commenced April 15th, 1896, and practically completed in October of the same year, with the exception of the rearrangement of part of the Randolph Street yard, which was completed during May and June of 1897. This work of depression was carried on in the face of a heavy traffic without any delay to trains and without any derailments. The material taken from under the tracks was used to assist in filling the triangular pieces of land acquired by the company under the agreement with the city.

One of the main difficulties in handling this work was the fact that several of the middle tracks were originally built on trestle piling, and during the depression it was necessary to excavate around the piling and frequently to remove each separate pile, piece by piece, the greater part of the piling being well preserved. The piles were pulled up by switch engines.

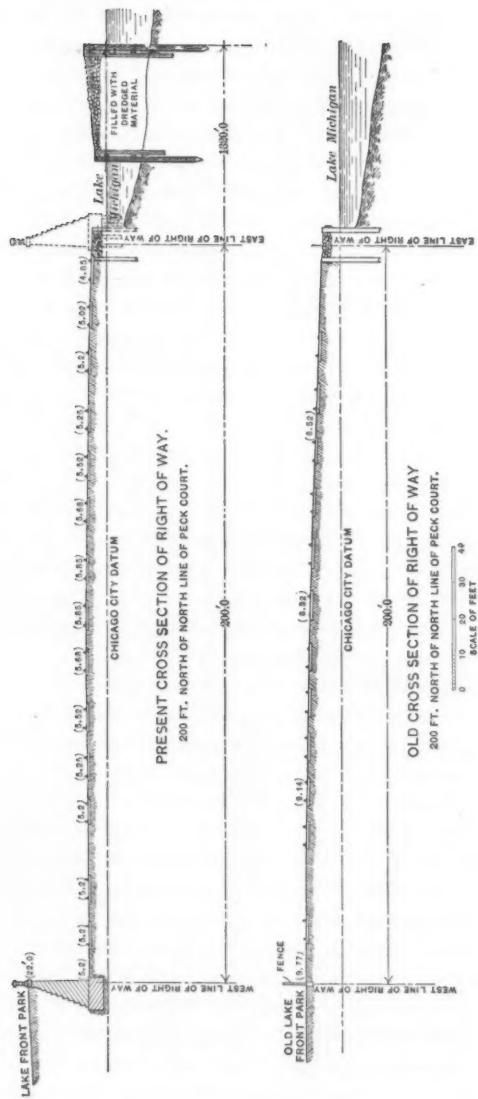
It was, of course, necessary to excavate material approximately 1 ft. below sub-grade, this space being refilled with slag, which was used for ballasting all the tracks except the express suburban, these being

ballasted with crushed rock. The volume of earth in this excavation was 110 000 cu. yds. Fourteen miles of track were depressed; and 10 crossings, 34 double-slip switches and 102 single-slip switches were depressed or laid on the new plan. The cost of the depression was \$57 000, averaging a cost of 78 cents per foot, including rearrangement of tracks, ballasting and surfacing on the various temporary locations which they occupied during the progress of the work. Fig. 2 shows cross-sections of the old and new track plans at points where the greatest depression was made.

*The Sea Wall.*—The object of the sea wall was to form an outer boundary of the new park which the city was endeavoring to provide for by this agreement with the railroad company, containing practically 165 acres in all, being 5 900 ft. in length, by an average of 1 350 ft. in width. This sea wall was constructed on a harbor line which had been previously established by the United States engineers.

The plans and specifications for the sea wall were furnished by Major W. L. Marshall, M. Am. Soc. C. E., of the Corps of Engineers of the United States Army, and the permit for its construction required a strict conformity to the plans and specifications furnished by him. As the City of Chicago expected to do a large amount of filling in the new outer Lake Front Park from the material dredged from the Chicago River and the Drainage Canal, the United States Government required that the sea wall be constructed before it would permit the dumping of any of this material in the area to be filled, in order that the filling might be effectually confined and prevent the shoaling up of the outer harbor. Sketches showing the manner of construction of the sea wall are given in Fig. 3.

Work on the sea wall was commenced in November, 1895, but operations were soon suspended on account of stormy weather and the approach of winter. Early in the spring of 1896 work was resumed, and the wall finally completed October 1st, 1896. The following quantities of material were contained therein: 105 000 lin. ft. of pilings; 2 233 000 ft. B. M. pine sheeting; 659 000 ft. B. M. waling; 3 433 cords of stone. These figures are round numbers. The amount of earth filling cannot be given, as this material was dredged from the bed of the lake directly into the bulkhead and no record was kept of it. The entire work cost in round numbers \$220 000. Altogether, 7 200 lin. ft. of sea wall were constructed.



512.

*Inner Lake Front Park.*—What was formerly known as the Lake Front Park was the strip of land 310 ft. in width, between Michigan Avenue and the Illinois Central right of way, and, as already described, extending from Randolph Street to Park Row. As noted in the terms of the contract between the city and the railroad company, the latter was required to furnish 200 000 cu. yds. of filling, to be used in grading the inner park so that its surface would slope from Michigan Avenue upward to the top of the retaining wall along the west edge of the right of way, instead of sloping downward to the level of the tracks as formerly. This filling was supplied in a small measure from various excavations for building foundations in the city, but generally by train, the contractors doing this work having made arrangements with the contractors of the Drainage Canal southwest of Chicago for this material, which was loaded by steam shovel out of the canal directly on cars and transported by rail to the Lake Front Park, the haul being 8 miles. This work was completed in November, 1896, at a total cost of approximately \$37 500.

The low price of this work was due mainly to the fact that the contractors excavating the Drainage Canal were required to get rid of the material at their own expense, and the contractor who filled the Park for the Illinois Central received pay from the Drainage Canal contractor for disposing of the material, which enabled him to do the work for the Illinois Central at a very low figure.

In the spring of 1897 the entire interest of the city in both the inner and outer Lake Front Park was transferred to the Board of South Park Commissioners, a special organization having control of the entire system of parks on the south side of the city. The Park Commissioners at the time of this writing have taken possession of the Lake Front Park and are now improving and beautifying it.

*Outer Lake Front Park.*—No provision has yet been made for the filling of the outer park. The area, as stated before, is 165 acres, and there is a depth of from 8 to 16 ft. of water in the basin, the average depth being about 12 ft. It is estimated that approximately 8 000 000 cu. yds. of material will be required to fill this area, according to the plans and grades that may be adopted. A recent act of the Legislature of the State of Illinois transferred to the South Park Commissioners whatever title the State might have had in the submerged land in question, and there were other provisions in the act which

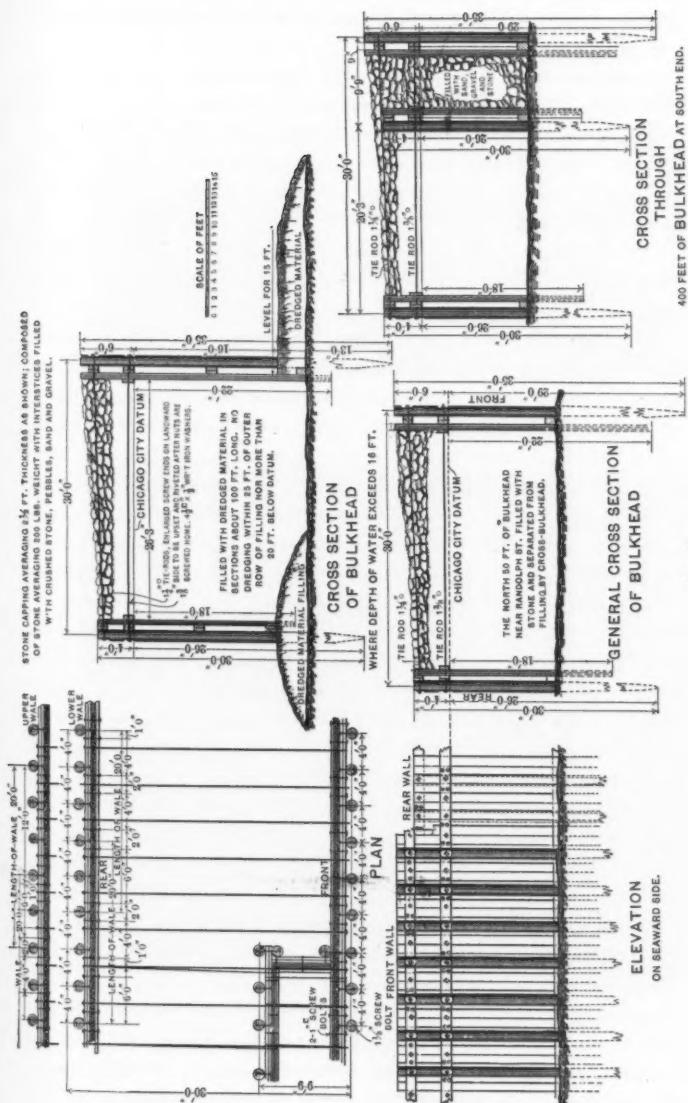


Fig. 8.

will eventually enable the Commissioners to complete the filling of the outer work.

*Retaining Walls.*—Among the works required to be done by the Illinois Central Railroad Company was the construction of two retaining walls, one on the west and one on the east side of the railroad right of way. The west wall has been constructed at a cost of \$120 000 in round numbers, its length being about 6 000 ft. Sections of this wall are shown in Fig. 4.

The construction of the east wall is being deferred until the outer park will have been sufficiently filled to permit of safe and economical construction.

*Viaducts.*—At the time of writing this paper, viaducts have been erected at Peck Court and at Harrison and Van Buren Streets. These viaducts consist of five girder spans resting on two end abutments at each edge of the right of way, and four intermediate piers 40 ft.  $3\frac{1}{2}$  ins. apart. These steel girders are of cantilever design, supported by steel columns imbedded in concrete foundations. This style of construction was requisite on account of the city authorities limiting the distance from the surface to the under side of the roadway of the viaduct (or, in other words, the thickness of the floors), it being obligatory in order to comply with these requirements, and give the minimum necessary headway of  $16\frac{1}{2}$  ft. for trains passing underneath, to make the floors as shallow as possible. In order to protect the intermediate steel columns from damage by possible derailments, they were encased in a concrete construction, forming piers at a height of about 4 ft. above the rail. Fig. 5 gives details of the viaducts, and Plate VII, Fig. 2, shows the concrete base.

Owing to the large number of engine movements under these viaducts and the closeness of the under steel surfaces to the smokestacks of the engines, it was anticipated that unusually rapid deterioration of the steel work would occur from the action of the acids generated by the gases emanating from the engines. Experiments with various kinds of paint and thin coverings of steel work having heretofore proved ineffective, it was determined to treat this problem in a radical manner and protect the steel in these structures by surrounding it with an air-tight casing of terra cotta, sealing the joints with Portland cement. The writer believes this form of treatment of bridges over railroad tracks to be original, and that it will prove a satisfactory so-

PLATE VII.  
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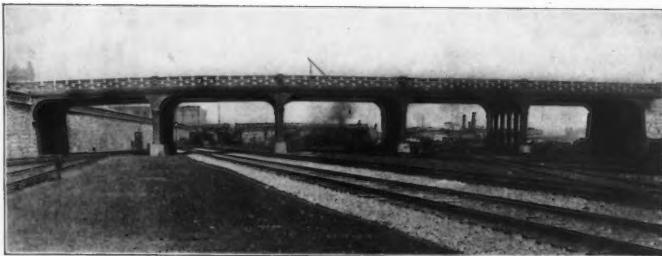


FIG. 1.

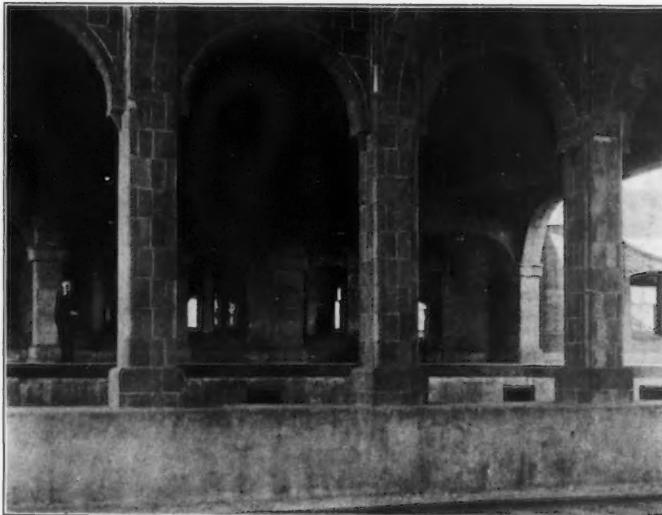
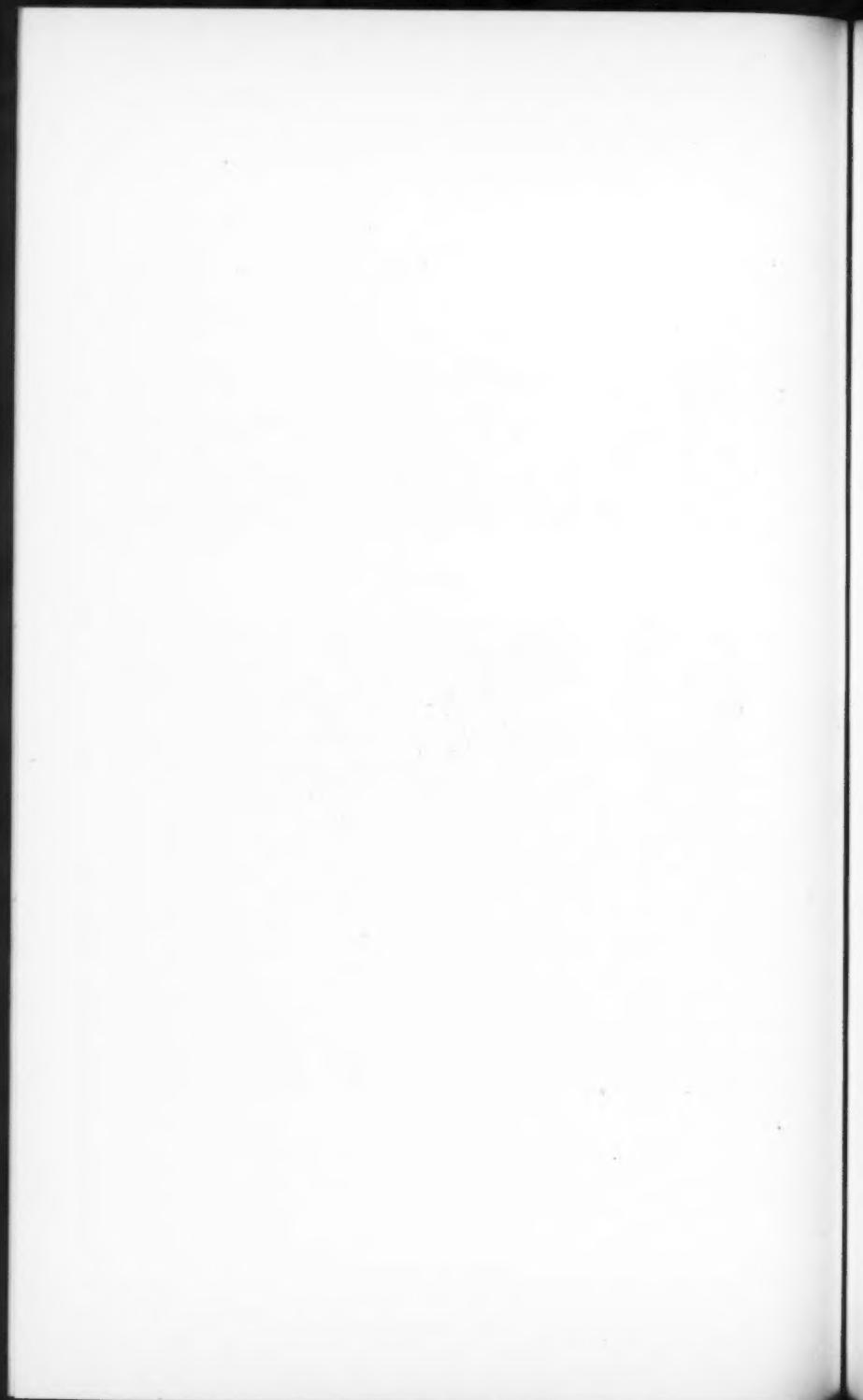


FIG. 2.



lution of the problem. Plate VII, Fig. 1, shows the general appearance of one of these viaducts as completed. The Van Buren Street viaduct, which was slightly wider than the others, and more ornamental on account of its proximity to the station, cost \$28 000.

*Drainage.*—Drainage for the depressed tracks has been provided by a complete system of sewers, shown in Fig. 6. The pipe used varied in size from 8-in. single to 24-in. double thickness, and has cost \$9 000. This sum, however, includes the cost of 230 ft. of 5-ft. pipe for the extension of the Twelfth Street sewer through the area filled in at that point.

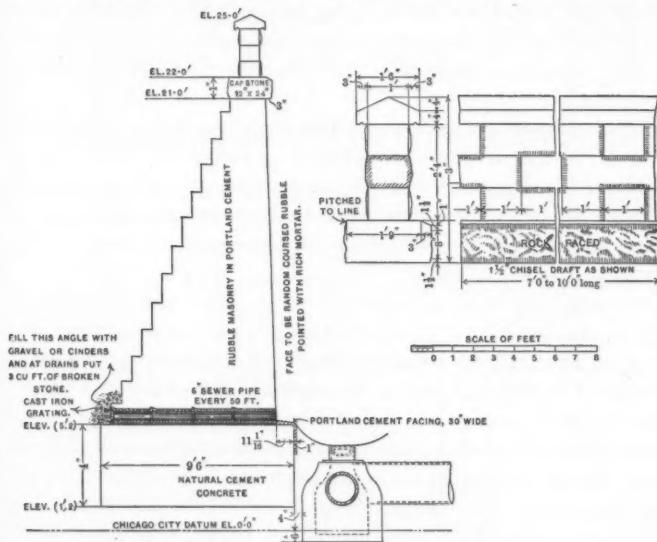


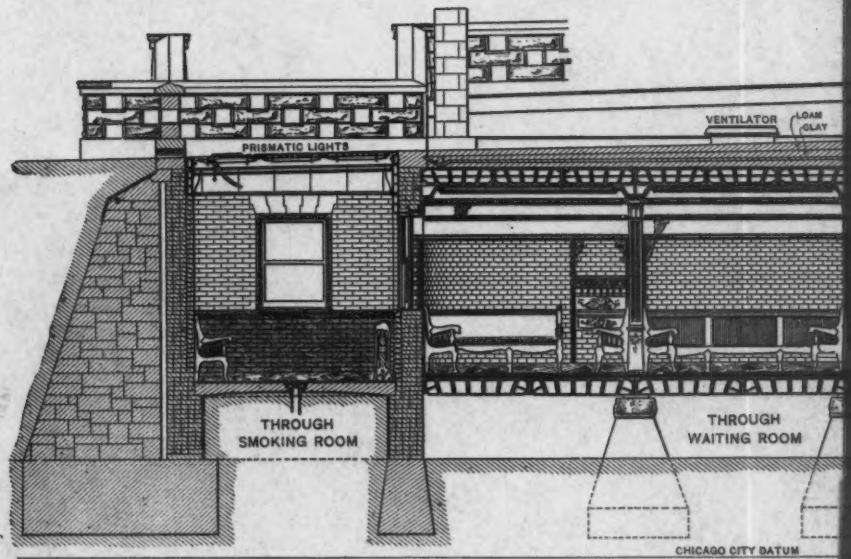
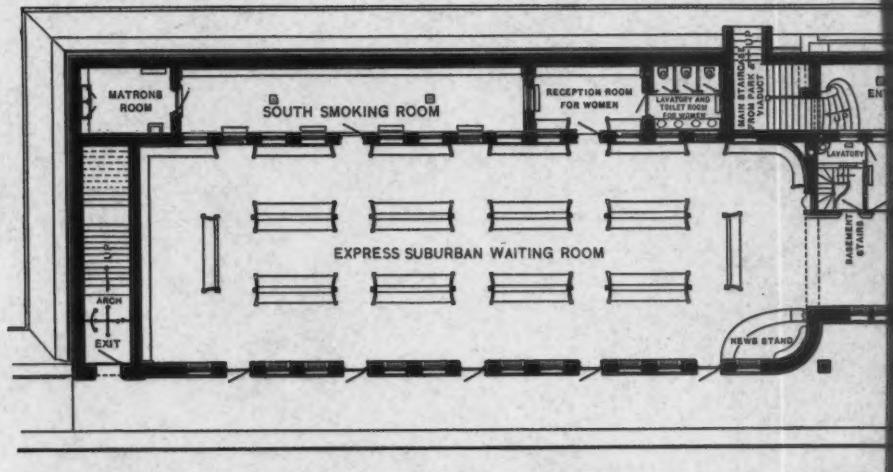
FIG. 4.

*Additional Filling.*—The area acquired from the city in the vicinity of Randolph Street, 6.67 acres, required 127 500 yds. of material for filling, while the area filled at Park Row and vicinity required 129 000 yds. of material, a total of 256 500 yds. Part of this material was obtained by pumping in sand from the bed of the lake at a cost of 14 cents per cubic yard, the remainder of the filling being secured from the excavation for depressing the tracks, from slag hauled in by train, and in a small way from material dumped in by private parties. This work has been completed at a cost of \$55 000.

*Van Buren Street Station.*—The contract with the city also provided for the construction by the Illinois Central Railroad Company of a suburban station at Van Buren Street. The ground assigned for this purpose was 300 ft. in length by 50 ft. in width, the city authorities requiring, however, that the roof of the building should not project above the general surface of the park or above the floor of the Van Buren Street viaduct, the center line of which passes directly over the station. It was further desired by the city authorities that this station should be so constructed as to permit of the growth of vegetation on its roof, so that, the station being underground, it would not take anything away from the surface area of the park. These limitations added materially to the difficulty of constructing a satisfactory station building.

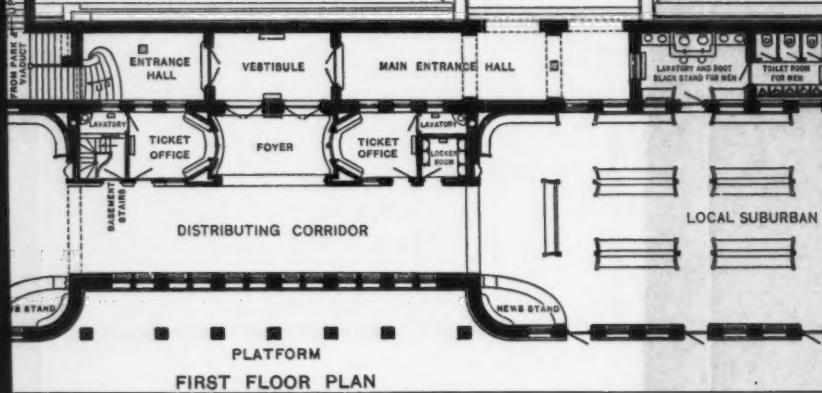
The grade of the tracks at Van Buren Street being 5.2 ft. above Chicago datum, the floor of the station was made 9.75 ft. above datum, bringing it on a level with the outside platform of concrete construction which extended along the front of the station (with wooden extensions several hundred feet each way), and on a level with the platforms of the suburban coaches.

In order to give access to the station from Michigan Avenue without requiring the use of steps, a long incline approach was constructed, 27 ft. in width, having a concrete floor, with masonry retaining walls. It started at Michigan Avenue, immediately north of the approach to the Van Buren Street viaduct, and entered the station by two steps at the foot of the incline, this rise being necessary on account of drainage. Entrance to the station is effected by passing to the right under the viaduct and into a loggia, which is flanked on either side by a ticket office; a connecting corridor from this, extending north and south into the main waiting rooms, each 106 x 34 ft., the north waiting-room being for passengers using the local suburban trains, and the south waiting-room for passengers using the express service. A space 10 $\frac{1}{2}$  ft. wide, extending the length of each waiting room, and in the rear, is set aside for toilet and smoking rooms and other conveniences. Over these is a prismatic roof, provided with suitably protected openings for ventilation, thus affording light and ventilation along the whole park side of the structure. On the track side of the station a continuous line of windows and doors gives light from that direction. In addition to this, a series of circular ventilators about 19 ft. apart was



SCALE OF FEET  
0 1 2 3 4 5 6 7 8 9 10 15 20 25 30

INCLINE APPROACH FROM  
MICHIGAN AVENUE



TRACK NO. 1

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0  
SCALE OF FEET

MICH

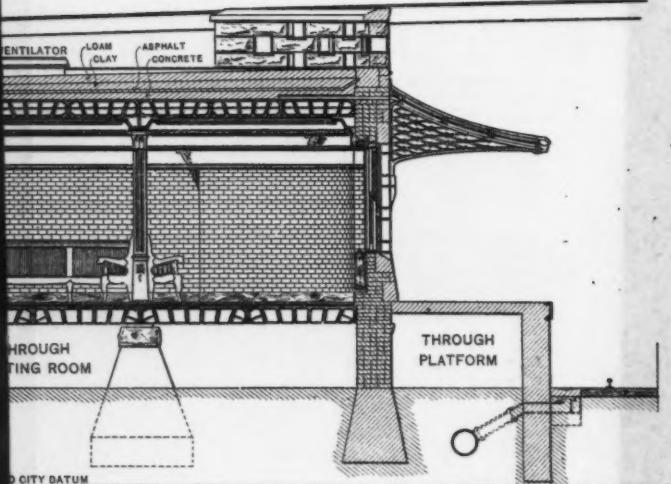
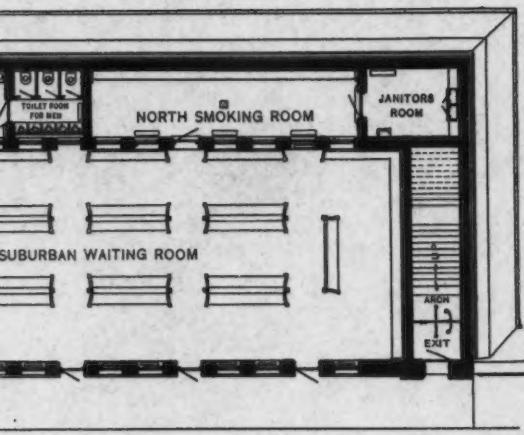
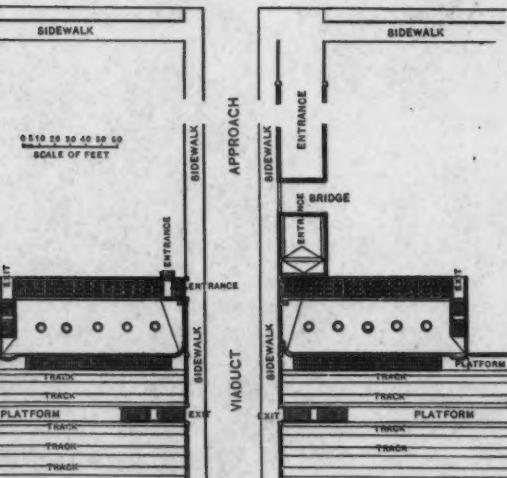


PLATE VIII.  
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MICHIGAN

AVENUE





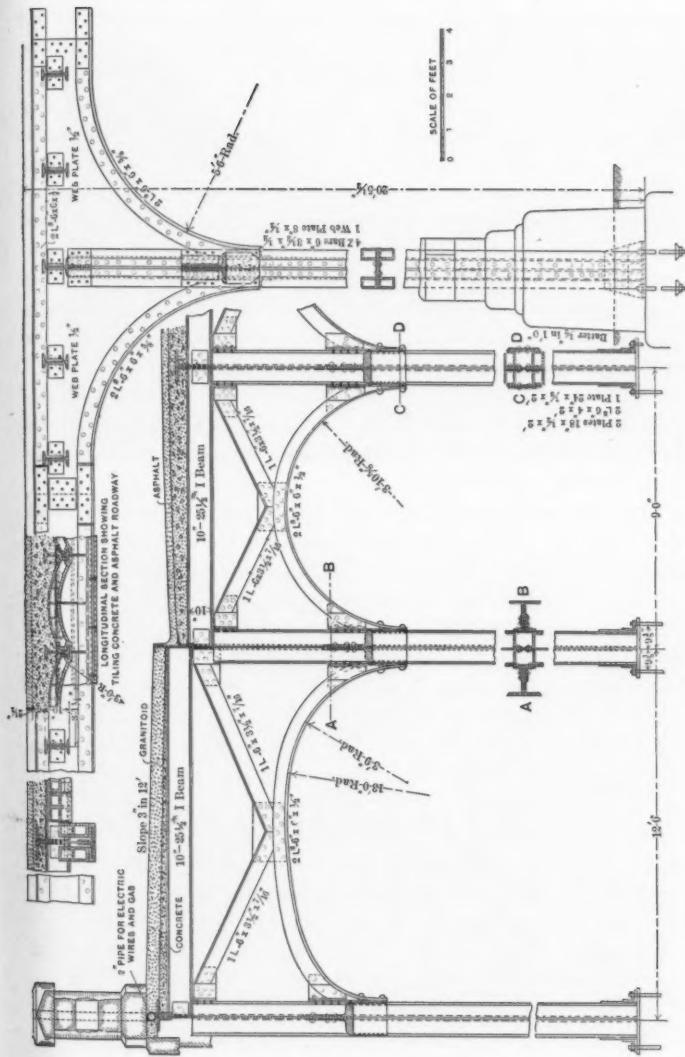


FIG. 5.

placed in the middle of the roof over the main waiting rooms. This system of lighting and ventilation has proved satisfactory. Plate VIII shows the details of construction, and Plate IX gives views of the exterior of the station and the main room.

A steam heating plant, in which natural gas is the generating power, is located in the basement, thus entirely avoiding any inconvenience and uncleanliness which would be caused by the use of coal for fuel. The station is lighted at night by electricity. The construction of the station is entirely and absolutely fireproof, the floors and roof being of girder construction, imbedded in terra cotta and concrete. The immediate covering of the floor is of vitreous tiling, while the side walls and intervening columns are covered with glazed tiling. No woodwork is used, except in the doors and window casings and the seats, which are of cherry.

Work on this station was commenced on June 15th, 1896, and completed the last day of the same year, though a part of the building was put in service on December 14th. The entire cost was, in round numbers, \$100 000.

The staff engaged in the design and execution of these Lake Front improvements, under the general direction of the author, was as follows:

David Sloan, M. Am. Soc. C. E., assistant chief engineer of the Illinois Central Railroad, had general charge of the depression and rearrangement of tracks, the filling of the park and the areas acquired by the railroad, and generally assisted the author.

H. W. Parkhurst, M. Am. Soc. C. E., engineer of bridges and buildings, was responsible for the construction of the Van Buren Street Station and the design and construction of the retaining wall, sea wall and viaducts.

Mr. H. U. Wallace, resident engineer, had personal and direct supervision of the execution of the entire work on the ground.

Mr. F. T. Bacon, architect, made the designs and detail plans of the Van Buren Street Station.

Mr. G. F. Jenkins, master carpenter, acted as superintendent of construction of the Van Buren Street Station.

The steel work of the viaducts was inspected by John Lundie, M. Am. Soc. C. E.

PLATE IX.  
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FIG. 1.

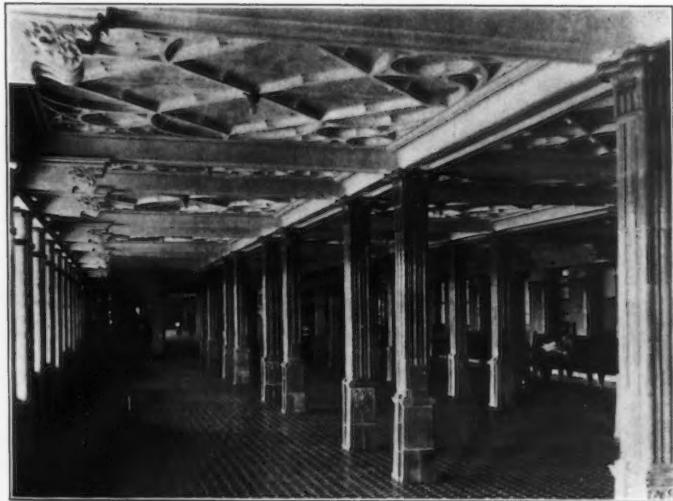
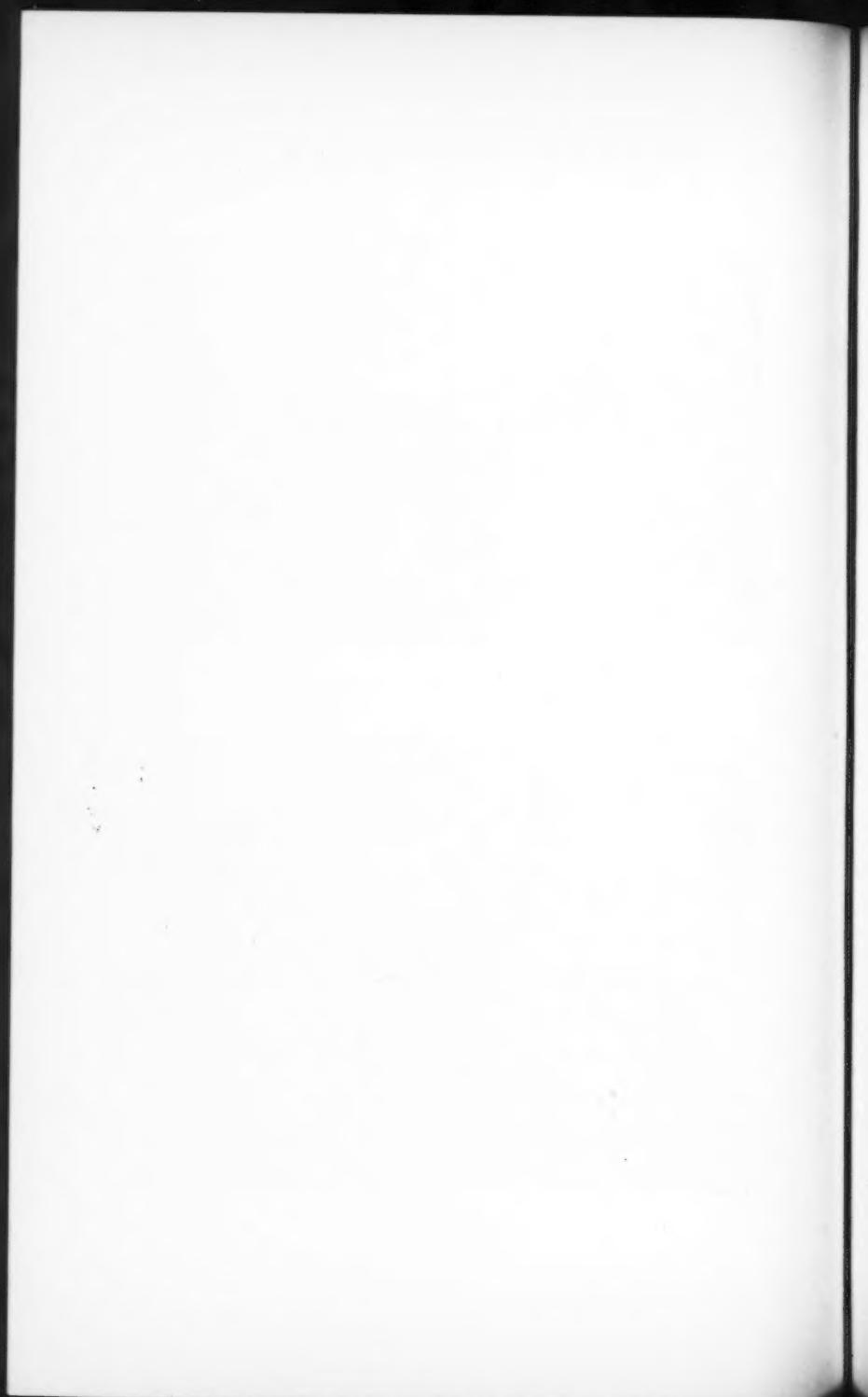
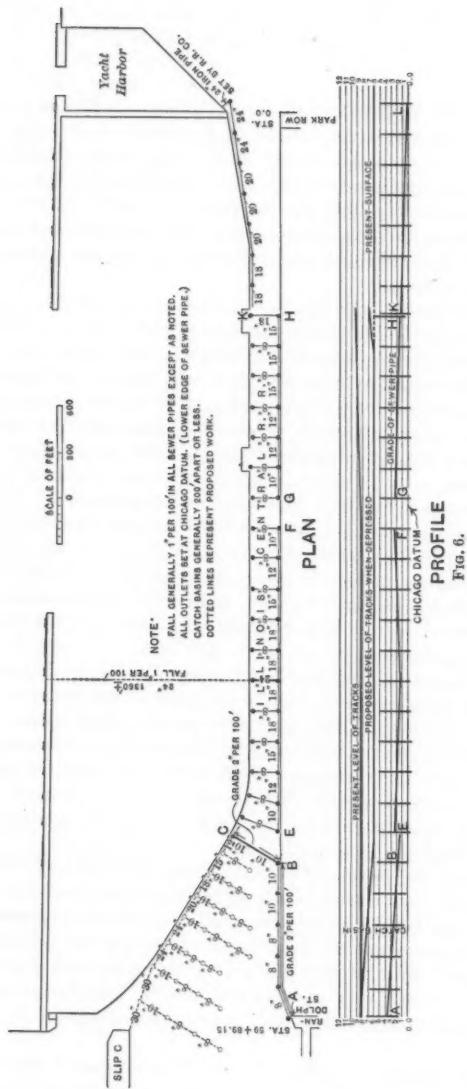


FIG. 2.





## DISCUSSION.

Mr. Purdy. CORYDON T. PURDY, M. Am. Soc. C. E.—Chicago has always been lacking in good breathing places in the heart of the city, although provided with a splendid system of outlying parks from three to six miles from the business center. The conditions there are such that a very large part of the business transacted is carried on in a comparatively small area included in this center, and the construction of a great park on the lake front, within the limits of this area, is bound to be of untold advantage.

The rejoicing was great in 1892 when it was found that the city had a good claim to the lake front. From that time on far-seeing men determined that Chicago should have a great park at the very center of the city. For some time the efforts of the Illinois Central Railroad Company to secure a settlement of the matter, that would be satisfactory to them as well as to the public, engendered an ill feeling toward the Company which it is understood has now given place to one of gratification.

The city has not only to rejoice in the prospect of the park and the hiding, so to speak, of the railroad traffic in the territory which will be given over to the park, directly in front of the Auditorium and other large hotels on the lake front, and which will be a lasting delight to thousands for all time to come, but it has also to rejoice that this same lake front can never be built up with docks for the handling of the lake commerce.

Chicago has long faced and is still facing a problem even greater than that of making a park in the center of the city—the problem of what to do with its constantly increasing commerce. Until within comparatively recent years, the long, narrow Chicago River was ample for the purpose. Now it is entirely inadequate, not only in length and breadth, but also in depth, there being only 16 to 18 ft. of water over the tunnels under the river. The result is that the lake commerce is turning toward the Calumet River.

At times it was proposed to build docks on the lake front, and, indeed, this has been done to some extent immediately about the mouth of the Chicago River. If the entire lake front had been given over to the shipping interests, the lake border of the city would have become like the dock front of New York City, bringing with it innumerable disadvantages, with very questionable benefits to compensate therefor. This is a great satisfaction to everyone having the good of the city at heart.

The lake tonnage entering and leaving Chicago is very great; indeed, few people, aside from those personally interested, have any

conception of the magnitude of the commerce. It has been estimated, Mr. Purdy, for example, that the tonnage passing through the Detroit River annually is greater than the foreign tonnage received and cleared from all the seaboard harbors of the country.

L. M. HAUPT, M. Am. Soc. C. E.—The facilities for lake shipments Mr. Haupt. at Chicago present a serious problem, as Mr. Purdy has shown. Some ten years ago the speaker prepared a plan for affording some relief by connecting the Calumet River with Lakes Wolf and George, and converting these lakes into a commercial basin with large wharfage facilities. Recently a syndicate has been formed for the same purpose, and it certainly seems as if Chicago would be forced to do something in this direction.

The tonnage passing through the Great Lakes is now very large, that through the Detroit River being estimated at about 40 000 000 more than the maritime commerce of London and Liverpool combined. The growth of the commerce through the Sault Ste. Marie canal has been phenomenal. The first locks accommodated vessels with a maximum draught of 12 ft.; they were enlarged in 1883 to a draught of 16 ft., and the tonnage increased at the rate of nearly 1 000 000 annually to 17 000 000, until the lockage facilities proved too small for the demand. Recently the new locks were built, but they have been in use for such a short period that their effect on the tonnage cannot be estimated as yet. The Canadian canal, recently opened, takes only about 5% of the total tonnage passing Sault Ste. Marie, so that its influence is slight. The total railway traffic in Illinois is about 70 000 000 tons, or about 10% of that of the United States.

EDWARD P. NORTH, M. Am. Soc. C. E.—The 17 000 000 tons passing Mr. North. the Sault Ste. Marie canal is about 1 000 000 tons less than the commerce entering and leaving the port of Liverpool, and 4 000 000 or 5 000 000 less than that entering and leaving the port of London. At Detroit there is not only this commerce, but also that of Chicago, which brings that total to over 40 000 000 tons.